

CLAIMS

1. A device for controlling the flow of fluid comprising:

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a. a rotor having a rotor fluid communication means and at least one rotor load bearing surface which rotor load bearing surface sealably engages a stationary load bearing surface, said rotor capable of assuming a first position and a second position by rotation;

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b. at least one stator having a stationary load bearing surface having stator fluid communication means, said stationary load bearing surface sealably engaging said rotor load bearing surface and permitting rotation of said rotor with respect to said stator, wherein in said first position said rotor fluid communication means and said stator fluid communication means prevent the flow of fluid and in said second position said rotor fluid communication and stator fluid communication means permits the flow of fluid; at least one of said rotor bearing surface and said stator load bearing surface having a diamond like carbon-silica coating;

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c. compression means for holding said at least one stator and rotor with said in rotor load bearing surface and stationary load bearing surface sealably engaged, and said diamond carbon silica coating providing a low friction and increased hardness allowing repeated movement between said first and second positions.

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2. The device of claim 1 wherein said compression means is a housing, said housing having a chamber for receiving said rotor and a means for holding said at least one stator.

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3. The device of claim 1 wherein said stator fluid communication means is at least one stator opening in said stator, said at least one stator opening for being place in fluid communication with a conduit.

4. The device of claim 1 wherein said rotor fluid communication means comprises at least one opening.
5. The device of claim 3 wherein said rotor fluid communication means comprises a channel for placing two or more stator openings in fluid communication.
6. The device of claim 1 wherein said diamond-like carbon-silica coating is 40-90% carbon, 20-40% hydrogen and 0.0 to 5% silica carbon.
- 10 7. The device of claim 6 wherein said diamond like carbon-silica coating is a DLC coating.
8. The device of claim 1 wherein at least one of said rotor and stator is comprised of a material selected from polyetheretherketone, tetrafluoroethelene, combinations of polyetheretherketone and tetrafluoroethelene, stainless steel, titanium and aluminum.
- 15 9. The device of claim 8 wherein said combination of polyetheretherketone and tetrafluoroethelene has a percentage of 50 to 90 percent polyetheretherketone and a percentage of 10 to 50 percent tetrafluoroethelene.
- 20 10. The device of claim 8 wherein said combination of polyetheretherketone and tetrafluoroethelene has a percentage of 60 to 80 percent polyetheretherketone and a percentage of 20 to 40 percent tetrafluoroethelene.
- 25 11. The device of claim 8 wherein at least one of said rotor and stator is comprised of stainless steel, titanium and aluminum and at least one of said rotor and stator is comprised of polyetheretherketone and tetrafluoroethelene and combinations of polyetheretherketone and tetrafluoroethelene, said rotor and stator comprised of stainless steel, titanium and aluminum having said diamond-like carbon silica coating.
- 30 12. A method of controlling the flow of fluid comprising the steps of:

providing a device having a rotor, at least one stator and compression means wherein said rotor has a rotor fluid communication means and at least one rotor load bearing surface which rotor load bearing surface sealably engages a stationary load bearing surface, said rotor capable of assuming a first position and a second position by 5 rotation; and said at least one stator has a stationary load bearing surface having stator fluid communication means, said stationary load bearing surface sealably engaging said rotor load bearing surface and permitting rotation of said rotor with respect to said stator, wherein in said first position said rotor fluid communication means and said stator fluid communication means prevent the flow of fluid and in said second 10 position said rotor fluid communication and stator fluid communication means permits the flow of fluid; at least one of said rotor bearing surface and said stator load bearing surface having a diamond like carbon-silica coating; and said compression means for holding said at least one stator and rotor with said in rotor load bearing surface and stationary load bearing surface sealably engaged, and said diamond 15 carbon silica coating providing a low friction and increased hardness allowing repeated movement between said first and second positions;

rotating said rotor from one of said first position and said second position to the other position, to control the flow of fluid.

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13. The method of claim 12 wherein said compression means is a housing, said housing having a chamber for receiving said rotor and a means for holding said at least one stator.

25 14. The method of claim 12 wherein said stator fluid communication means is at least one stator opening in said stator, said at least one stator opening for being place in fluid communication with a conduit.

15. The method of claim 12 wherein said rotor fluid communication means comprises 30 at least one opening.

16. The method of claim 14 wherein said rotor fluid communication means comprises a channel for placing two or more stator openings in fluid communication.
17. The method of claim 12 wherein said diamond-like carbon-silica coating is 40-
5 90% carbon, 20-40% hydrogen and 0.0 to 5% silica carbon.
18. The method of claim 17 wherein said diamond like carbon-silica coating is a
DLC coating.
- 10 19. The method of claim 12 wherein at least one of said rotor and stator is comprised
of a material selected from polyetheretherketone, tetrafluoroethelene, combinations of
polyetheretherketone and tetrafluoroethelene, stainless steel, titanium and aluminum.
- 15 20. The method of claim 19 wherein said combination of polyetheretherketone and
tetrafluoroethelene has a percentage of 50 to 90 percent polyetheretherketone and a
percentage of 10 to 50 percent tetrafluoroethelene.
- 20 21. The method of claim 19 wherein said combination of polyetheretherketone and
tetrafluoroethelene has a percentage of 60 to 80 percent polyetheretherketone and a
percentage of 20 to 40 percent tetrafluoroethelene.
22. The method of claim 19 wherein at least one of said rotor and stator is comprised
of stainless steel, titanium and aluminum and at least one of said rotor and stator is
comprised of polyetheretherketone and tetrafluoroethelene and combinations of
25 polyetheretherketone and tetrafluoroethelene, said rotor and stator comprised of
stainless steel, titanium and aluminum having said diamond-like carbon silica coating.
23. As in claim 1 but with more than 2 positions.